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AN ANALYSIS OF COAST GUARD ENLISTED RETENTION

by

Kurt R. Wellington

March, 1993

Primary Advisor: George W. Thomas

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This thesis investigated the factors that influenced the retention of Coast Guard enlisted personnel. A multivariate regression model was developed for a sample of 377 first-term, four-year males. The model was estimated using data from the Coast Guard Personnel Management Information System data base (demographic, trainability, enlisted, enlisted performance and unit characteristics), and results from the Coast Guard 1991-1992 CAREER DECISION SURVEY to determine their relative importance in retention behavior. The results suggested that members' trainability (measured by AFQT scores) and age upon original entry into the service had important effects upon retention. Personnel who thought about leaving the service most due to command climate and coworker issues were more likely to leave the service than personnel who thought about leaving the service most due to pay and benefits, self-development, working environment and family and personal life issues. This suggests that policies which improve general working conditions and job satisfaction, as well as self-development and pay and benefits issues and service impact upon personal and family life appear to have positive impacts upon retention. Detailed recommendations were provided for additional variables in the model and survey improvement. These findings can help the Coast Guard managers and manpower planners understand the important influences upon junior enlisted personnel retention decisions and the impact personnel policies can have upon those decisions.

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An Analysis of Coast Guard Enlisted Retention

by

Kurt R. Wellington
Lieutenant Commander, United States Coast Guard
B.S., United States Coast Guard Academy, 1978

Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

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ABSTRACT

This thesis investigated the factors that influence the retention of Coast Guard enlisted personnel. A multivariate regression model was developed for a sample of 377 first-term, four-year males. The model was estimated using data from the Coast Guard Personnel Management Information System data base (demographic, trainability, enlisted, enlisted performance and unit characteristics), and results from the Coast Guard 1991-1992 CAREER DECISION SURVEY to determine their relative importance in retention behavior. The results suggested that members' trainability (measured by AFQT scores) and age upon original entry into the service had important effects upon retention. Personnel who thought about leaving the service most due to command climate and coworker issues were more likely to leave the service than personnel who thought about leaving the service most due to pay and benefits, self-development, working environment and family and personal life issues. This suggests that policies which improve general working conditions and job satisfaction, as well as self-development and pay and benefits issues and service impact upon personal and family life appear to have positive impacts upon retention. Detailed recommendations were provided for additional variables in the model and survey improvement. These findings can help Coast Guard managers and manpower planners understand the important influences upon junior enlisted personnel retention decisions and the impact personnel policies can have upon those decisions.

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I. INTRODUCTION

A. BACKGROUND

The United States Coast Guard is a 200-year old maritime service operating under the auspices of the Department of Transportation. The Coast Guard's maritime missions are:

- Search and Rescue
- Maritime Law Enforcement
- Marine Safety
- Port Security and Safety
- Defense Operations
- Aids to Navigation
- International Ice Patrol

To carry out these missions, the service has a personnel structure similar to, but much smaller than, that of the U.S. Navy, with approximately 6,000 officers and 31,000 enlisted personnel on active duty. The enlisted structure is comprised of the ten military enlisted pay grades, E-1 through E-10. They can be categorized as follows:

- E-1: non-rated enlisted personnel in recruit training.
- E-2, E-3: non-rated enlisted personnel who are receiving basic specialized training at an "A" school, or are

stationed at Coast Guard units awaiting orders to an "A" school or are receiving on-the-job skill training in the petty officer striker program.

- E-4 through E-9: rated enlisted personnel, or petty officers, who have a technical skill, generally referred to as a rating. Within each rate, advancements to the next higher pay grade are vacancy-driven, based upon satisfactory completion of established requirements. Petty officers usually stay in the same rate for their entire Coast Guard career.
- E-10: the Master Chief Petty Officer of the Coast Guard.

The Coast Guard ratings may be divided into the 23 active duty military occupational skills indicated in Table I. The ratings have been grouped as shown because basic skill training, occupational similarities and the likelihood of transfer of those military skills to subsequent civilian employment suggest retention behavior may be similar. Also, the small personnel inventories of some of the rates would limit the model's predictive abilities.

Enlistment contracts are typically four to six years in length, although minimum required service time upon completion of "A" schools may require service extension. Upon completion of an enlistment and approval by the Coast Guard, an individual may either:

- reenlist for another three to six years,
- extend the current enlistment up to six years,
- leave the active duty to join the Coast Guard Reserves, or
- leave the service entirely.

TABLE I

COAST GUARD ENLISTED RATINGS

Groupings	Enlisted Rating	Designation
Aviation	Aviation Machinists's Mate	AD
	Aviation Electrician's Mate	AE
	Aviation Structural Mechanic	AM
	Aviation Survivalman	ASM
	Aviation Electronic Technician	AT
Engineering	Damage Controlman	DC
	Electrician's Mate	EM
	Electronics Technician	ET
	Machinery Technician	MK
	Telephone Technician	TT
Ordnance	Fire Control Technician	FT
	Gunner's Mate	GM
Admin	Health Services Technician	HS
	Musician	MU
	Public Affairs Specialist	PA
	Radioman	RM
	Storekeeper	SK
	Subsistence Specialist	SS
	Yeoman	YN
Deck	Boatswain's Mate	BM
	Marine Science Technician	MST
	Quartermaster	QM
	Radarman	RD

During the 1980s, Coast Guard first term petty officer reenlistment rates had been hovering around 60 percent. However, the reenlistment rate fell dramatically, from 64 percent to 43 percent, between July 1987 and July 1990, before returning to its earlier level later in 1990. To understand better the issues involved in the reduction in reenlistment rates, a Coast Guard reenlistment decision survey addressing five basic categories of personnel and job satisfaction variables was designed by the Office of Personnel, Workforce Planning Division at Coast Guard Headquarters (G-PWP). The data from that survey forms the basis of this thesis.

B. RESEARCH OBJECTIVE

The primary research objective was to develop a retention model that explained the decision of Coast Guard enlisted personnel to stay in or leave the service.

This thesis also examined three subsidiary research questions. First, it identified the variables that influence first term enlisted personnel to stay in or leave the Coast Guard. Second, it assessed the validity of the survey results by comparing respondents' reenlistment intentions to their subsequent reenlistment actions. Finally, this paper examined some implications of the enlisted retention model upon Coast Guard personnel policy.

C. METHODOLOGY

The data base used in this thesis was the Coast Guard's 1991-1992 CAREER DECISION SURVEY developed by the Workforce Planning Division at Coast Guard Headquarters. This voluntary reenlistment decision survey was mailed to all enlisted personnel whose enlistments expired between November 1991 and November 1992.

Survey results were linked to the Coast Guard's personnel management information system (PMIS) data base to permit demographic analysis of the survey responses. Since this study examined the dichotomous stay/leave decision, the following definitions apply for the purpose of this thesis:

- STAY = reenlist or extend (intended as well as actual)
- LEAVE = leave the service entirely or leave active duty to join the Coast Guard Reserve (intended as well as actual)

The study did not break down the dichotomous stay/leave decision any further because the small sizes of some Coast Guard rates would limit the model's predictive abilities.

A logit regression model was developed to describe the dichotomous retention behavior of the first-term enlisted personnel. This model provided the likelihood of a Coast Guard enlisted member making the decision to stay in the service, given his individual attributes. It allowed the evaluation of the characteristics of leavers and stayers.

The methodology will be explained in greater detail, along with a complete description of the data bases used, in Chapter III.

D. ORGANIZATION OF THE STUDY

The literature review in Chapter II summarizes civilian and military-oriented retention issues and research. Chapter III examines the survey response and PMIS data bases used to measure retention, and reviews the methodology used to specify the retention model. Chapter IV reviews the problems encountered with the two data bases and outlines the possible effects of those problems upon the results. The results of the models are also presented. Validation of the models are provided, by comparing actual stay/leave decisions of Coast Guard personnel with their stay/leave intentions indicated in the survey. Chapter V provides the retention model conclusions and manpower policy implications. Recommendations for further research are also provided.

II. LITERATURE REVIEW

A. GENERAL COMMENTS

Retention studies examine those factors that influence employees to either leave or stay in an organization. The leaving, or turnover, may be considered to be either involuntary or voluntary in nature. According to Mobley [Ref. 17], involuntary turnover generally represents an organization's personnel losses beyond the control of the individual, such as serious illness or injury, death, and temporary or permanent layoffs. Voluntary turnover, on the other hand, refers to those situations in which the individual leaves an organization of his/her own volition. It is also the most common form of turnover that organizations encounter. Most turnover research addresses voluntary turnover, since it is assumed that organizational personnel policies have a significant impact upon it.

Although turnover generally evokes negative connotations, it has both positive and negative individual and organizational implications. From the individual's perspective, the effects of turnover are dependent upon the individual's character and particular situation. Turnover can hurt career advancement, tenure and total earnings, cause loss of other organizational benefits and increase stress

dramatically. At the same time, turnover allows individuals to pursue careers in other organizations that are better suited to their needs (by offering increased earnings, improved career advancement opportunities, organizational values that reflect their own personal values, and so on). Job psychologists have long recognized that being able to satisfy these personal needs helps to reduce stress on the individual employee.

For those employees remaining behind, turnover often results in increased workload, disruption of social and communication patterns, loss of worker cohesion and possibly decreased commitment. Likewise, it could also signal new opportunities for advancement. The entry of new, motivated employees might also foster a renewed sense of satisfaction, cohesion and commitment among the older employees.

Organizationally, turnover most notably results in increased recruiting and training costs, as well as temporary loss of productivity and possibly increased workload among the employees remaining with the organization. In fact, Mobley observed that limited empirical evidence does suggest leavers are predominantly better performers. On the other hand, turnover also implies eliminating inefficient performers and the infusion of new perspectives, ideas and knowledge from the replacement employees.

Human Capital Theory [Ref. 10] proposes that workers will respond relatively predictably in given situations, ceteris paribus. Essentially, it suggests that:

- workers will leave lower-paying jobs for higher-paying jobs,
- workers have a higher probability of quitting when it is relatively easy to obtain better jobs quickly, and
- turnover falls as employee age increases and job tenure rises.

The following two sections will address those studies that summarize the factors generally considered to be the most important determinants of retention.

B. CIVILIAN TURNOVER STUDIES

In 1973, Porter and Steers [Ref. 19] reviewed 15 earlier studies conducted by other researchers and concluded that turnover was inversely related to overall job satisfaction. The closer the job comes to meeting one's total intrinsic and extrinsic expectations on the job, the greater one's job satisfaction. They proposed four general categories of factors involved in job satisfaction:

- organization-wide factors, such as pay and promotion policies,
- immediate work environment factors, such as supervision and worker relations,

- job-related factors, such as the nature of the job, and
- personal factors, including age, seniority and family considerations.

In 1986, Cotton and Tuttle [Ref. 7] completed a meta-analysis summarizing the results of over 120 previous studies. Many of the studies came to very opposite conclusions about the causes of turnover. They compiled three categories of determinants of turnover: external factors, work-related factors and personal characteristics, as shown in Table II.

Cotton and Tuttle found age, pay, tenure, overall job satisfaction, employment perceptions, education and many demographic variables to be stable, reliable correlates with turnover. Task repetitiveness, accession rate and intelligence were found to be weakly related to turnover, if at all. Unemployment rate, job performance, role clarity, satisfaction with coworkers and promotional opportunities, marital status and aptitude were found to be moderately related to turnover.

They also noted that national economic data were reliably correlated with aggregate turnover, but not with individual turnover. Although very few of the studies at that time included variables for met expectations, behavioral intentions or organizational commitment, they nonetheless identified them as reliable predictors of turnover.

TABLE II

META-ANALYSIS CORRELATES OF TURNOVER

Turnover Correlates		Direction of Relationship Upon Turnover
External	Employment perceptions	Positive
	Unemployment rate	Negative
	Accession rate	Positive
	Union presence	Negative
Work-related	Pay	Negative
	Performance	Negative
	Role clarity	Negative
	Task repetitiveness	Positive
	Overall satisfaction	Negative
	Pay satisfaction	Negative
	Satisfaction with work itself	Negative
	Satisfaction with supervision	Negative
	Satisfaction with coworkers	Negative
	Satisfaction with promotion	Negative
	Organizational commitment	Negative
Personal	Age	Negative
	Tenure	Negative
	Gender	Women positive
	Education	Positive
	Marital status	Married negative
	Number of dependents	Negative
	Intelligence	Positive
	Behavioral intentions	Positive
	Met expectations	Negative

Source. Cotton and Tuttle, "Employee Turnover: A Meta-Analysis and Review with Implications for Research", Academy of Management Review, Vol 11, No 1, pp 55-70, 1986.

In 1982 Arnold and Feldman [Ref. 1] used multivariate regression analysis upon responses from a survey of 654 accountants. They examined a number of demographic, tenure and cognitive/affective variables, as well as perceived job security, intentions to search, perceived alternatives and intent to change jobs. Turnover was found to be more strongly related to intentions to search for alternative jobs than to intentions to change jobs. They found a significant relationship between the dependent variable, actual turnover, and independent job-related variables (such as tenure, satisfaction with work, potential alternatives, perceived job security, etc.). Also, demographic variables (such as age, gender, marital status and number of dependents) and cognitive/affective variables (such as job satisfaction, organizational commitment and satisfaction of expectations) were shown to influence turnover indirectly through their impact upon intent to find other employment.

In 1979 Kushell [Ref. 14] explained that employee satisfaction was also a key element in an effectively-managed organization. He noted that companies were competing for the shrinking supply of high quality employees with increasingly competitive salaries and benefits, yet those recruits had very high turnover rates approaching 35 percent.

He explained these high turnover rates as a function of the quality of the working environment. He advised senior

management to consider what their employees really want, in contrast to what managers thought their employees wanted, in order to maintain an effective, productive working environment. His common-sense guidelines on reducing turnover included:

- Always keep employees informed on company matters,
- Set up clear channels of communications between employees and top management,
- Always define a person's job and expected results,
- Encourage employee creativity, try to keep the job as challenging as possible,
- Encourage self-improvement, point out opportunities for advancement,
- Do not oversell a candidate on the merits of a job at the employment interview.

He highlighted several indicators to help correct excessive turnover problems, such as:

- Examine the kind of person who is leaving the organization (from marginal performers to the top performers),
- Determine the differences between the survivors and non-survivors in the organization,
- Determine how better managerial assistance could have succeeded in retaining more of the better people,
- Determine what types of people choose to join and not join the organization in the first place.

C. MILITARY RETENTION STUDIES

In 1964 Bluedorn [Ref. 3] proposed a U.S. Army officer turnover model based upon a review of civilian and military turnover studies. He hypothesized that two sets of exogenous variables, organizational structure and environment, had indirect effects on turnover through their impact upon job satisfaction.

His regression model accounted for about 65 percent of the variance in U.S. Army officer turnover. This suggests that intent to leave does precede actual turnover. Also, he found that organizational control, a common facet of military life, actually added only a relatively small amount of explanatory power to the model, although he had expected it to be one of the more significant causes of turnover.

In 1979 Fowler and Ramsey, Jr. [Ref. 11] attempted to identify the causes of the high rate of turnover among first and second class petty officers in the U.S. Coast Guard. 297 petty officers stationed in San Francisco and south Texas responded to a questionnaire or were interviewed. Most of the respondents were in their second or subsequent Coast Guard enlistment. More than half of them were either considering leaving or were going to definitely leave the service upon completion of their present enlistment.

The major causes of dissatisfaction and voluntary separation from service were identified as declining benefits and inadequate pay. Additional reasons for separation

included poor leadership, poor quality of subordinates and an inability to specialize in one aspect of their ratings. On the other hand, these same individuals were proud of the Coast Guard missions and the meaningful work they were able to accomplish. They recognized their employment in the service as being very secure. In essence, they found that the rewards of their jobs did not outweigh the negative features of military service in the late 1970's, when military pay and benefits were not keeping pace with related developments in the civilian labor market.

In 1981 Siggerud [Ref. 20] investigated the factors that influence enlisted retention in the Navy, using the 1978 Department of Defense Survey of Enlisted Personnel. He found that the most important factors for retention intentions were:

- military pay and civilian opportunities,
- duty station (sea duty or shore duty),
- family considerations.

He observed that the effects of total military pay, perceived civilian opportunities, duty station and work environment vary significantly among personnel in different ratings, due to the large differences in occupational environments among ratings.

If pay was below some threshold level, people would leave the service even when civilian pay differentials were expected to be minimal. The military probably was paying rent to the

lowest educated personnel, while enlisted personnel with more than a high school diploma were underpaid. Not surprisingly, there seemed to be a large difference between perceptions and reality as to the probable civilian income level they could attain.

First-termers serving onboard ship had generally much lower retention rates that those who serve ashore. Those differences were smaller for second-termers, but for third-termers, the retention intention rates were higher for those at sea.

Family separation was a complaint of all personnel, whether afloat or ashore, although it was obviously more significant for afloat personnel.

In 1983 Christensen [Ref. 5] conducted a multivariate analysis of Navy first term enlisted turnover intentions, using data from the 1978 Department of Defense Survey of Officers and Enlisted Personnel. She examined males and females who were within one year of the end of their service contract. Logit analysis was used to examine the effect of pecuniary, demographic, tenure, and job satisfaction variables upon the likelihood of reenlisting.

The single most influential factor was a variable measuring the respondent's perception of his/her family being better off in a civilian job. Satisfaction with military life was the second most influential variable. As special pays increase, she noted that reenlistment probabilities also

increased. Not surprisingly, respondents currently on shipboard duty had lower probabilities of reenlistment than their counterparts on shore duty. Interestingly, the demographic variables and tenure were not significantly explanatory variables for reenlistment intentions.

In a 1984 study of the effect of non-pecuniary factors on Navy reenlistment, Warner and Goldberg [Ref. 22] described the Annualized Cost of Leaving (ACOL) model, which hypothesized a relationship between pecuniary and non-pecuniary aspects of a job. They estimated the difference between the sum of the present values of an individual's expected future military earnings for a number of years, including retirement benefits, and the sum of the present values of that same individual's expected civilian wages over the same time period if he were to leave the service. That value was used to calculate a person's annualized cost of leaving the military (ACOL). That ACOL was compared to one's net preference for civilian life, defined as the difference between the annual monetary equivalent of the non-pecuniary aspects of a military job and that of a civilian job. Individuals with larger ACOLs would reenlist. The study estimated a PROBIT model, using reenlistment decision as the dependent variable and ACOL, marital status and unemployment rates as independent variables. The data were for enlisted personnel from 16 different U.S. Navy occupational groups who had to make their initial reenlistment decision between FY74 and FY78.

The study found that ACOL was a significant factor in determining the reenlistment decision. As expected, Warner and Goldberg also found that a higher incidence of sea duty reduced reenlistment rates at every paygrade examined. They found that reenlistment bonuses were the Navy's best method of countering the negative effect of sea duty, thereby allowing personnel managers to control retention rates effectively. Also, findings indicated that married individuals are more likely to reenlist. The impact of unemployment was found to be significant in half of the occupational groups. This study confirmed the hypothesis that those Navy skills having a higher incidence of sea duty will have lower pay elasticities.

In 1987 Cymrot [Ref. 8] used the ACOL approach with a sequential logit model to analyze the effect of selective reenlistment bonuses (SRB) upon the retention of U.S. Marine Corps enlisted personnel. There are possible problems with simultaneity bias that may cause the model to misstate the effects of SRB. Essentially, he determined that SRB increases have the greatest effect upon retention. The second most important variable was rank, with higher ranking Marines more likely to remain in the service. Other variables that had some effect upon retention were demographic characteristics and job satisfaction.

Gotz and McCall [Ref. 12] proposed a retention model in 1984 for the U.S. Air Force which expands upon the ACOL model. They assumed individuals would make their reenlistment

decision based upon which alternative offered them the greatest expected payoff. The factors involved in that determination include advancement probabilities, military pay, retirement benefits, severance pay, expected civilian pay, net monetary equivalent of non-pecuniary aspects of service life and the monetary equivalent of unexpected events which may affect a retention decision. Variables contributing to determination of retention rates were fiscal year in which an individual's service obligation ends, number of years of initial obligation, occupational specialty, length of service, component (regular or reserve), rank and year of service in which promoted to that rank. The model was found to predict retention rates accurately.

Motowidlo and Lawton [Ref. 18] hypothesized a causal relationship for the reenlistment decisions of soldiers in which individual perceptions of satisfaction with military life and expectations of military life affected reenlistment intentions and therefore actual reenlistment.

They concluded that satisfaction indirectly influences turnover intentions, and therefore actual retention through its effects on expectancies. Consequently, they suggested that strategies for reducing turnover must emphasize personnel policies which promote job satisfaction, improve job conditions, supervisory conditions and other organizational features to minimize dissatisfaction.

In 1985, Ward and Tan [Ref. 21] conducted a study examining the quality of those who reenlisted as compared to those who left the service. They used data on approximately 11,000 enlisted personnel from the four military services found in the 1974 Entry Cohort File developed by the Defense Manpower Data Center. First, they developed an index of job performance that combines entry-level recruit attributes (such as AFQT level and educational level) with first term promotion histories. Then, they used this quality index to asses relative importance of these characteristics as well as other 'unobserved ability' factors for evaluating the military's success in retaining high quality enlisted personnel. They looked at two occupations from each of the services that they considered to be specialized, highly skilled and arduous, as follows:

- U. S. Army: Infantry and Medical Technician,
- U. S. Navy: Radioman and Boiler Technician,
- U. S. Air Force: Aircraft Mechanic and Communications & Intelligence,
- U. S. Marine Corps: Aircraft Mechanic and Machine Gunner & Mortarman.

They found that the military generally was successful in keeping high quality personnel, with the proportion of leavers and reenlistees in each AFQT category comparable to the proportions of initial recruits in each category. Also, the

very low quality personnel were attriting before the end of their first enlistment. They found that the 'unobserved ability' factors actually had a much greater effect upon the quality index, across all occupations, than either high school diploma or AFQT. They suggested that retention policies should not depend heavily upon mental category or pre-service educational achievement as much as upon individual achievement, such as number of promotions.

In 1987 Lamboni [Ref. 15] analyzed the reenlistment decisions of first-term military personnel across the four services using the 1985 Department of Defense Survey of Officer and Enlisted Personnel. Looking at those personnel with less than one year of remaining service on their initial contract, he examined the five following categories of factors:

- Demographic information
- Job tenure
- Cognitive/affective orientation
- Income and economic incentives
- Perception of civilian employment alternatives.

Factor analysis was used to combine a number of independent variables within the cognitive category in order to reduce the number of variables to a more manageable size

for further estimation. He then used probit and logit analysis techniques to analyze the data.

Lamboni found that many of the exogenous variables influenced the reenlist or leave decision. Generally, servicemen in non-technical occupations were more likely to reenlist than those in technical occupations. Reenlistments were directly affected by level of outstanding debt, suggesting that service members preferred the steady income associated with military service over the risks of insufficient civilian salaries, given some level of existing debt. Naturally, the perceptions of service members' likelihood of finding good civilian jobs significantly affected reenlistment decisions. Also, he observed that reenlistment intentions were very sensitive to the level of satisfaction with the quality of military service life.

In 1989 Hempell and Parshall [Ref. 13] used the Navy enlisted personnel responses to the 1985 Department of Defense Survey of Officers and Enlisted Personnel and the 1985 Department of Defense Survey of Military Spouses, as well, to allow them to determine the spouse's influence upon the reenlistment decision. The data were broken down by term of enlistment, and then further stratified by gender and by the number of months remaining until the end of active obligated service (EAOS) into three periods, as follows:

- 0-6 months,

- 6-12 months,
- 12-24 months.

For all groups, they found that stated intentions accurately predict actual reenlistment behavior. Factors influencing the reenlistment decision change as the reenlistment term itself changes. Essentially, reenlistments increased as the term of enlistment increased. Also, the effect of special pays only significantly affected reenlistment rates of married first termers. Factors influencing reenlistment decisions differed between males and females. Females were more sure of their retention decision than their male counterparts. Factors influencing the reenlistment decision changed as the period before the EAOS changed. Those intending to reenlist, regardless of EAOS period, were less likely to change their minds than those who said they were going to leave the Navy during the same EAOS periods. Finally, they also showed that spouse and family both have an important influence on a member's reenlistment decision.

In 1990, Boisvert and Sumner [Ref. 4] used a linear regression model in their study of retention for non-prior service, male, four-year contract marines. They were looking for relationships between performance-based indicators of quality, such as proficiency and conduct marks, awards and educational improvement, with biographical data measures of

quality, such as AFQT percentile score and high school diploma. Their model included variables for AFQT category, medal awards, continued education and enlisted performance evaluations, but did not include many of the more common demographic variables such as age, marital status and race.

Data base management procedures prevented them from obtaining all the data they required for their study. There was no significant relationship shown between superior performance and high AFQT scores, medal awards and continued education. Nonetheless, they determined that individuals with lower AFQT scores were more likely to be low performers, and individuals who have received awards were more likely to be high performers. There was only a weak relationship between AFQT scores and proficiency marks, suggesting that AFQT scores may be valid for enlistment purposes, but they were not useful for predicting performance or career potential. Continued education had no significant effect upon performance.

In 1989 Lempe [Ref. 16] conducted a multivariate analysis of factors affecting first and second term U.S. Air Force enlisted retention. Using data from the 1985 Department of Defense Survey of Officer and Enlisted Personnel, he applied logit analysis to variables in demographic, tenure, cognitive and economic categories for each term of service and occupational group.

He found those in higher mental categories tended to separate at greater rates than those in lower mental

categories. SRB had a positive and significant effect upon reenlistment for those in their first term, but a negative and significant effect for those in their second term. This suggests that those induced to remain in the service by a bonus leave after receipt of the bonus. Hence, it might take an even larger bonus in the second term to induce such members to remain another term. Satisfaction with military life and perceived civilian job opportunities were important factors for all enlisted personnel making the reenlistment decision, regardless of sex, race or occupational group. Those with higher levels of education were more likely to leave the service than those with lower levels of education. Spouse's income was significant to the retention decision of second term personnel. Minorities, older personnel, and males were more likely to reenlist, suggesting that recruiting might be more effective if specific groups of people were targeted.

In a recent study Dunteman, et al, [Ref. 9] analyzed over 10,000 Army enlisted responses to the 1985 DOD Survey of Enlisted Personnel using weighted least squares regression. The dependent variable was the individual's self-assessed likelihood of reenlisting, while the independent variables represented individual and family, family program, military job and career, and military environment factors.

For both single and married members, they found military job and career variables and military environment variables to be important predictors of self-assessed probability of

reenlisting, although they were more significant for married members than for single soldiers. Both single and married soldiers with children had greater self-assessed likelihoods of reenlisting than those without children, with single parents having a greater likelihood than married parents. For married personnel, satisfaction with Army environment for families and base recreation facilities were significant. Interestingly, the effect of satisfaction with location for single and married soldiers was not significant upon their self-assessed likelihoods of reenlisting.

Cooke, Marcus and Quester [Ref. 6] included the effect of military operational tempo upon reenlistment intentions. As the Navy downsizes, an important issue centers around its Personnel Tempo of Operations (PERSTEMPO) policy. This policy attempted to strike a balance between the support of national objectives and reasonable operating conditions for its Naval personnel. The PERSTEMPO instruction promulgateed deployment standards for Naval personnel. It was a reaction to the low retention of the late 1970's, which was thought to be a result of the long deployments and short turnaround periods.

They examined the reenlistment decisions of male sailors between FY79 and FY88 who served at least 30 continuous months afloat before their reenlistment decision. The personnel were categorized into:

- 4-year obligors at the first reenlistment decision,

- married 4-year obligors at the first reenlistment decision,
- reenlistment decisions of enlisted personnel in their eighth to tenth year of service (YOS).

They used logit regression analysis upon five categories of independent variables representing demographics, enlisted occupational categories, type of ship, PERSTEMPO, and location of ship maintenance facilities.

They found no systematic patterns of reenlistment intentions for the relatively senior 8 YOS to 10 YOS enlisted personnel. However, for four-year obligors, they found that retention was lowered by long deployments, short turnaround periods and increased underway time when not deployed. Also, the character of unit activities between deployments (such as yard periods) significantly affected job satisfaction and retention. On the other hand, crises (the Beruit crisis was referenced) increased retention despite the prolonged deployments or shortened turnaround periods.

Military pay, relative to perceived civilian earnings, had an important effect upon retention. For the single 4-year obligors, an SRB of 1 or a 10 percent basic pay increase was needed to increase their retention rates enough to balance out the decreases noted in the previous paragraph. Likewise, married 4-year obligors required an SRB slightly greater than 2, or a basic pay increase greater than 10 percent, to balance out the decreased retention rates described earlier.

III. DESCRIPTION OF DATA AND METHODOLOGY

A. SURVEY DESIGN AND ADMINISTRATION

The Office of Personnel, Work Force Planning Division, at Coast Guard Headquarters, was tasked with designing a survey capable of developing the information needed to grasp fully the issues involved in retention decisions. A review of military retention literature and Department of Defense retention research was conducted. A conceptual framework for the major variables contained in the literature was developed. The survey questions in each category selected to be used as measures for specific concepts are shown in Table III.

The 1991-1992 CAREER DECISION SURVEY contains 119 questions. A copy of the survey is attached in APPENDIX A. All but three of the questions were designed to fit within one of the following five factors:

- Pre-enlistment situation
- Attraction of present Coast Guard job
- Future Coast Guard opportunities
- External opportunities
- Personal and family issues

TABLE III SURVEY QUESTION SELECTION

CONCEPT	VARIABLES	SOURCE OF MEASURES
Pre-enlistment situation	A. Pre-enlistment expectations versus actual outcomes B. Reasons for enlisting	A. Chisholm B. Bluedorn Scale
Attraction of present job	A. Extrinsic motivators - Benefits - Pay B. Intrinsic motivators C. Institutional motivators D. Job satisfaction - Organizational control - Supervisor/peer relations - Group work process - General work climate	A. Included in career decision question matrix B. In career decision matrix C. In career decision matrix D. USAF Survey of Organizations (Hendrix)
Future expectations	A. Promotion opportunities B. Training opportunities C. Assignment opportunities	A. Marsh B. Developed question C. DOD 1985 Survey & developed question
External alternatives	A. Perception of civilian job alternatives	A. Bluedorn Scale & DOD 1985 Survey
Non-job factors	A. Family status B. Military way of life	A. Marsh & DOD 1985 Survey B. Marsh & DOD 1985 Survey
Outcome of career decision	A. Strength of career commitment	A. USCG G-P Personnel Support Program Survey

Source: 1991-1992 CAREER DECISION SURVEY, (Office of Personnel & Training, Workforce Planning Division, USCG Headquarters, August 1991), p. 8.

The remaining three questions were concerned with the individual's reenlistment intentions and career intentions. Each of the five categories was expected to affect retention independently. Table IV lists the survey questions that apply to each of the five primary categories, as well as the three career-oriented questions.

The Coast Guard decided to conduct an analysis upon those personnel whose enlistments were scheduled to expire between November 1991 and November 1992. Beginning in the fall of 1991, Headquarters mailed surveys and answer sheets on a monthly basis to those personnel whose enlistments were scheduled to expire within the next two to three months. The surveys were voluntarily completed by the enlisted personnel and returned to headquarters for computer compilation. There was no follow-up done to increase the survey return rate, which was projected to be about 50 percent, with a higher return rate anticipated for senior enlisted personnel than for junior enlisted personnel. The responses were then appended to the PMIS data base by SSN to provide demographic and military background information about the respondents.

The conceptual model for Coast Guard enlisted retention includes the five categories of survey variables mentioned earlier, as well as several categories of personal and job characteristics. It is predicted that reenlistment intentions

TABLE IV

CATEGORIES OF SURVEY QUESTIONS

GENERAL SURVEY FACTORS	SURVEY QUESTIONS
Preenlistment Situation	
Reasons for Enlisting	Q1 - Q15
Attraction of Present Coast Guard Job	
Communications	Q17 - Q19
General Command Climate	Q20 - Q24
Management/Supervision	Q25 - Q30
Advancement/Recognition	Q32 - Q34
Work Group Processes	Q35 - Q37
Unit Productivity	Q38 - Q40
Job Task Autonomy	Q41 - Q43
Intrinsic Job Rewards	Q44 - Q49
Job Elements	Q51 - Q54
Future Coast Guard Opportunities	
Promotion Opportunities	Q55, Q72, Q73
Training Opportunities	Q56
Assignment Opportunities	Q57 - Q59
External Opportunities	
Environmental Pull	Q61 - Q69
Personal & Family Issues	
Family Status	Q31, Q50, Q60
Military Way of Life	Q74 - Q115
Met Expectations	Q116 - Q119
Career Orientation	
Reenlistment Intentions	Q16
Current Career Plans	Q70
Confidence of Career Plans	Q71

and actual behavior are not only a function of the perceptions identified in the survey, but also of other variables that reflect the characteristics of individual enlisted members, their jobs and units. Specific elements drawn from the PMIS data base are categorized as follows:

- Demographic characteristics,
- Trainability characteristics,
- Coast Guard enlisted characteristics,
- Coast Guard enlisted performance characteristics,
- Coast Guard unit characteristics.

A schematic diagram to explain the conceptual model further is provided in Figure 1. Essentially, the diagram summarizes how the PMIS-oriented variables and survey responses, as well as intentions to leave or stay, can influence the actual stay or leave behavior being examined in this thesis.

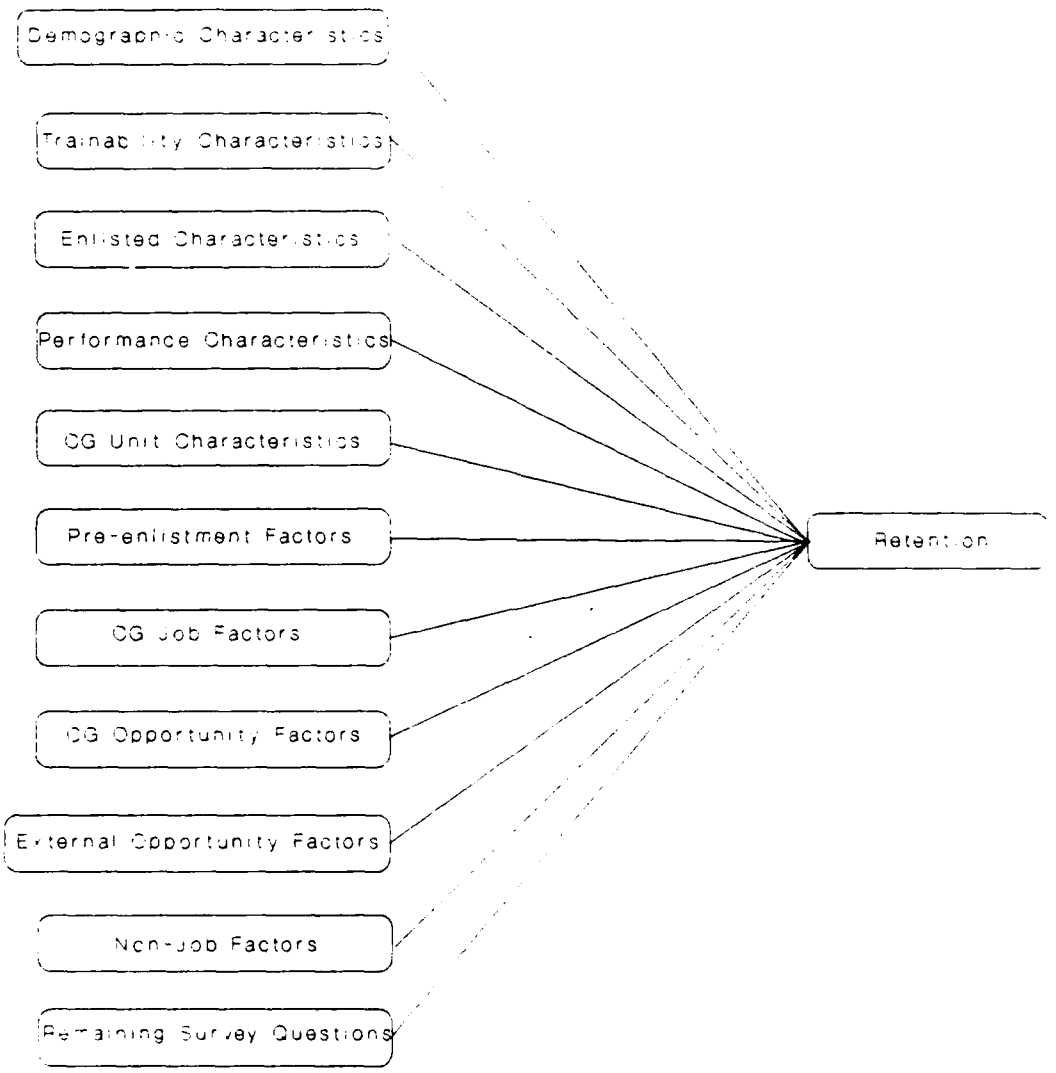

Figure 1

Conceptual Retention Model

B. DESCRIPTION OF THE DEPENDENT VARIABLE

The dependent variable, STAYERS, was obtained by comparing the PMIS data base in November 1991 to the data base in November 1992, giving most of the initial 2,400 respondents a minimum three-month window to decide to leave or stay. Those respondents whose enlistments or extensions expired between 01 December 1991 and 01 November 1992 were examined to determine if they reenlisted, extended or left the service. Those personnel extending or reenlisting during that time frame were classified as STAYERS, otherwise they were classified as LEAVERS. Stayers are coded as '0' and leavers as '1' in the model.

C. DESCRIPTION OF THE INDEPENDENT VARIABLES

1. Demographic Variables (Obtained from the PMIS data base)

a. Family Status (SNC, PWC, MNC)

Two PMIS data base elements, MS and DEPSX, were used to create three family status variables. MS is a discrete variable and categorizes marital status as annulled, divorced, interlocutory, legally separated, married, single, widowed or no information available. DEPSX is a discrete variable that lists the number of dependent children a member has. The family status variables have been coded into three dummy variables as follows:

SNC = 1 = single personnel having no children

PWC = 1 = personnel (married or single) having children

MNC = 1 = married personnel having no children

It was predicted that SNC would have a negative effect upon intention to reenlist and upon actual reenlistment. Due to the higher level of job security and other family-related benefits offered by the military, it was predicted that PWC and MNC would both have positive effects upon intention to reenlist or upon actual reenlistment, although the effect of PWC was anticipated to be stronger than that of MNC.

2. Trainability Variables (Obtained from the PMIS data base)

a. AFQT Mental Category (CATI, CATIIIA, CATIIIB

The AFQT is intended to serve as an indicator of trainability and ability and is used in this thesis as a proxy for enlisted performance. The AFQT mental categories are obtained by categorizing the AFQT scores in the PMIS data base element ENIQS. A group of mental category dummy variables was developed, as follows:

CATI = 1 = AFQT category I

CATII-IIIA = 1 = AFQT categories II or IIIA

CATIIIB-IV = 1 = AFQT categories IIIB or IV

AFQT category IIIA was coded to include CAT II personnel because cross tabulation comparison indicated very similar rates of staying and leaving among the two categories. AFQT

category IIIB includes two category IV observations. Historically, AFQT has been a weak predictor of reenlistment intentions. Since personnel with higher AFQT scores are assumed to have a higher level of ability and trainability than personnel with lower AFQT scores, it is assumed they are more likely to accept the risks accociated with leaving the service to pursue civilian job alternatives. Consequently, members having higher AFQT scores are more likely to have more alternative job choices then members having lower AFQT scores. As a result, it was predicted that as these variables increase from CATIIIB towards CATI, the effect upon intention to reenlist and actual reenlistment would be negative.

3. Coast Guard Enlisted Variables (Obtained from PMIS)

a. Paygrade (E4, E5, E6)

In the PMIS data base the discrete element PGC indicates each member's present paygrade. It can range from E-1 to E-9. To improve sample homogeneity, the sample was restricted to E-4 through E-6. Three dummy variables, E4, E5 and E6, were used to represent the three paygrades. It was assumed the higher the paygrade that personnel could attain in four years, the more likely they were to desire to remain in the service until retirement. However, this does not control for the fact that some ratings offer slower or faster advancement opportunities than the majority of ratings. Nonethless, it was predicted that as these variables increase

from E4 towards E5, the effect upon intention to reenlist and actual reenlistment would be positive.

b. Rating Group (ADMIN, AVIATION, ENG, OPS)

The PMIS data base element RRC is a discrete, three-digit code indicating the job specialty or skill of each military member. Twenty-three of the ratings were examined in this thesis. To reduce the number of dummy variables in the model, ratings were combined into the traditional Coast Guard rating groups, as shown in TABLE I-1. Those rating groups are: Administration, Aviation, Deck, Engineering and Ordnance. Since cross tabulations indicated very similar behavior for Deck and Ordnance personnel, those two groups were combined into one group, called OPS. It was predicted that those rating groups having a greater likelihood of civilian labor market equivalents (specifically, the electronic and mechanically-oriented ratings) would have a lower intention to reenlist and actual reenlistment behavior.

c. Entry age (ENTRYAGE)

The ages of personnel upon entering the Coast Guard range from 17 years to 27 years. This variable was calculated as follows:

(Base Pay Date) - (Date Of Birth) = ENTRYAGE

The remaining months and days were truncated from the ENTRYAGE variable, creating a discrete variable. Examination by cross tabulation indicated personnel with an entry age between 17

and 21 years had very similar retention behavior, while personnel with an entryage over 21 years also had very similar behavior. Consequently, the variable was recoded as follows:

OLDER = 0 = entry age between 17 and 21 years

OLDER = 1 = entry age between 22 and 27 years

Research suggests that, as entry age increases for new personnel, they are more inclined to remain with their current employer, either because of an improved employer/employee match, a reluctance to risk leaving the secure employment of the service for potentially less secure civilian employment or because of perceptions that the military offers a greater range of benefits and potentially higher job satisfaction to junior personnel than do most civilian employers. Another argument suggests that older individuals may have had unpleasant experiences with the civilian labor markets and feel forced to remain in the military because they perceive themselves as having very limited alternatives in the civilian labor market. Consequently, it was predicted as entry age increases, the effect upon intention to reenlist and actual reenlistment would be positive.

4. Enlisted Performance Variables (Obtained from PMIS)

a. Commanding Officer's Endorsement Upon Enlisted ADC (APPADC)

The PMIS data base element, ADC-CO, indicates the level of endorsement a commanding officer provided for a

member's Assignment Data Card (ADC). The ADC, more commonly referred to as the 'Dream Sheet,' permits a member to provide input into the assignment process. A commanding officer's endorsement is required for enlisted ADCs. The three levels of endorsement are approved, conditional approval or disapproved. This variable was designed to serve as a proxy for enlisted performance evaluations. However, this may be inaccurate, since CO's may conditionally approve ADC's for other than performance-related reasons. ADCs generally receive positive endorsement unless the individuals either do not meet time-in-grade or time-at-unit requirements or have not been performing adequately. Since so few ADCs were disapproved, all conditional and negative ADC endorsements were combined. This variable has been recoded into a dummy variable as follows:

APPADC = 1 = positive endorsement by CO

APPADC = 0 = conditional or negative endorsement by CO

It was predicted that a positive endorsement would have a positive effect upon intention to reenlist and actual reenlistment, while a conditional or negative endorsement would have a negative effect.

5. Coast Guard Unit Variables (Obtained from PMIS)

a. Present Unit Description (AFLOAT)

The discrete PMIS data base element, CFRCD, indicates whether a member's present duty station is INCONUS

or OUTCONUS, restricted, afloat or ashore. It was recoded as follows:

AFLOAT = 1 = present duty station afloat

AFLOAT = 0 = present duty station ashore

It was assumed that the positive and negative job characteristics of the present billet would influence a member's intentions to stay or leave the service. It was assumed that AFLOAT billets are more demanding of personal time than shore billets, and therefore less desireable than shore billets. It was predicted that personnel who were presently stationed at shore units would have a higher intention to reenlist and actual reenlistment.

6. Survey Responses

a. Issues of Dissatisfaction (Q114A, Q114BC, Q114D, Q114E, Q114F)

Survey question Q114 indicated which one of the following six categories made an individual think about leaving the Coast Guard the most:

- A = Pay and Benefits
- B = Command Climate
- C = People I Work With
- D = Self Development
- E = Working Environment
- F = Family and Personal Life

The survey question had been designed such that an individual could only respond affirmatively to one of the six categories. Responses to Q114B and Q114C were combined since cross tabulations indicated similar retention behavior for personnel who chose either of these response categories. Combining the two variables permitted a reduction in the number of independent variables. To provide useful interpretation of the responses, Q114 was recoded into five dummy variables as follows:

Q114A = 1 = Pay and Benefits made a person think about leaving the Coast Guard the most

Q114BC = 1 = Command Climate and People I Work With made a person think about leaving the Coast Guard the most

Q114D = 1 = Self Development issues made a person think about leaving the Coast Guard the most

Q114E = 1 = Working Environment issues made a person think about leaving the Coast Guard the most

Q114F = 1 = Family Personal Life issues made a person think about leaving the Coast Guard the most

Previous research suggested younger, junior military personnel tend to be more present-oriented than older, more senior military personnel. Therefore, it was predicted that personnel who had selected A, BC or F as the category that made them

think about leaving the Coast Guard the most would have a lower intention to reenlist and actual reenlistment behavior than personnel who had selected D or E.

b. Reenlistment Intentions (INTENT)

INTENT was used as the dependent variable in a subsequent estimation of the model and is derived from the responses to survey question Q16 in the CAREER DECISION SURVEY. This question sought to determine each member's intentions upon the end of his/her current enlistment and offered the five following responses:

(1) Get out of the Coast Guard

(2) Extend

(3) Reenlist

(4) Retire

(5) Undecided

It was recoded as follows:

INTENT = 1 if Q16 equals 1 or 4

INTENT = 0 if Q16 equals 2 or 3

The 61 individuals who were undecided about whether they were going to remain in the service or leave were deleted from the sample. Deleting those personnel from the model who were undecided served to increase the differences between those personnel intending to leave and those intending to stay and was expected to make the model results easier to interpret. It was assumed that survey respondents were acting rationally

when responding to this question. Therefore, it was predicted that INTENT would be a relatively accurate indicator of one's likelihood of reenlisting and actual reenlistment.

7. Factors

Factor analysis was used within each of the five categories of survey questions. Factor analysis is a technique used to determine whether or not underlying patterns of relationships exist among a group of variables, such that the data may be reduced to a smaller set of common factors or components that may be taken as source variables accounting for the observed interrelations in the data. [Theilmann, p38] The number of factors actually chosen for each category of questions was based upon:

- those factors with Eigenvalues greater than or equal to one,
- those factors that seemed to represent logical groups of variables.

In an effort to reduce the number of independent variables in the model, only two factors representing external employment opportunities, Factor41 and Factor42, were used in the model. The factors were rotated with a varimax rotation technique to improve their interpretations. Table V summarizes the questions that load heavily on each of the factors, which represent as dimensions each of the five categories of

questions in the survey. The loadings of the survey questions upon the factors can be found in APPENDIX B.

Due to the very strong loading of Q61 upon its own factor, it was dropped from the External Opportunities factors and treated as a separate variable. Survey question Q61 is a self-assessment of the comparison of military to alternative civilian wages available to the individual. Responses range from a value of one, "military alternatives are better," to a value of three, "civilian alternatives are better." It was predicted that personnel responding that civilian alternatives offered better compensation would have a lower intention to reenlist or actual reenlistment.

Those survey questions which were directed towards married personnel or personnel in subsequent tours were often skipped or answered "Not Applicable" by single personnel and many personnel in their first enlistment. Consequently, Q31, Q50, Q53, Q57, Q58, Q59, Q60, Q74, Q88, Q90, Q91, Q101, Q104, Q116, Q117, Q118 and Q119 were dropped from the factor analysis, as Table V indicates. Also, Q49 was dropped due to very low loadings on any of the factors.

TABLE V

COMPONENT FACTORS FOR EACH SURVEY CATEGORY

Survey Categories	Factor Names	Questions	General Factor Contents
Preenlistment	Factor11	Q4 Q6 Q7 Q8 Q9	Job Satisfiers
	Factor12	Q2 Q3 Q5 Q11 Q14 Q15	Job Security & Benefits
	Factor13	Q1 Q13	
	Factor14	Q10 Q12	Training & Education Leave Home & Parents
Present Coast Guard Job	Factor21	Q17 Q18 Q19 Q20 Q21 Q24 Q25 Q26 Q27 Q28 Q29 Q30 Q32 Q34 Q35 Q36 Q37	Unit Communications & Work Processes
	Factor23	Q22 Q23 Q33 Q38 Q39 Q40 Q43 Q41 Q42 Q44 Q45 Q46 Q47 Q48 Q51 Q52 Q54	Job Satisfiers
Coast Guard Opportunities	Factor31	Q72 Q73	Career Expectations
	Factor32	Q55 Q56	Future Opportunities
External Opportunities	Factor41	Q65 Q67 Q68 Q69	Job Satisfiers
	Factor42	Q62 Q63 Q64 Q66	Job Security & Benefits
Non-Job Factors	Factor51	Q82 Q93 Q94 Q105 Q106 Q109 Q110 Q112 Q113	Work Conditions
	Factor52	Q77 Q79 Q81 Q83 Q84 Q85 Q86 Q97 Q98 Q99 Q100 Q107 Q108 Q111	Autonomy
	Factor53	Q75 Q76 Q92 Q96	Military Pay & Benefits

D. MODEL SPECIFICATION

For the purposes of this study, retention is defined as an individual enlisted member's decision to stay in the Coast Guard. Alternatively, the member may choose to leave the service. Therefore, the retention outcome can be modelled with a dichotomous (stay or leave) dependent variable. The dependent variable was obtained by comparing the November 1991 PMIS data base to the November 1992 data base. Stayers were identified as those survey respondents who extended or reenlisted during that 12-month time frame. Stayers are coded as '0' and leavers as '1' in the model.

This binary stay-or-leave choice is best examined with the logistic regression model, which restricts values of the dependent variable to either 0 or 1. Logit regression analysis is used to estimate how the explanatory variables are related to the reenlistment decision. This is done by calculating the change in the probability of reenlistment for changes in the independent variables.

The logit model is based on the cumulative logistic distribution function, such that:

$$P_i = \frac{1}{1 + e^{-(B_0X_0 + B_1X_1 + B_2X_2 + B_3X_3 + \ldots + B_kX_k)}}$$

where:

P = the probability that an individual reenlists, given the personal attributes X_1, X_2, X_3, ..., X_k,

e = base of the natural logarithm,

X_k = data base values for each of the explanatory variables in the model,

B_k = values of the estimated parameters, provided by the logit model,

k = number of explanatory variables in the model.

The retention model was used with STAYERS as the dependent variable. Selection of independent variables was based upon theoretical assumptions about major influences upon retention behavior. However, independent variables were also selected to minimize multicollinearity among variables.

First-term enlisted personel considering their first reenlistment decision are more likely to be younger and single than their second or third enlistment counterparts. Consequently, they may attach a different level of importance to many of the factors in the survey than second or third term enlisted personnel. In order to develop a more homogeneous sample, this model examined only four-year enlisted personnel serving their first enlistment.

Only the External Opportunities category was not addressed by Q114. Factor Analysis of External Opportunities

was used to develop two separate factors for the retention model.

The first-term enlisted personnel retention model specification is:

REENLISTMENT = f(SNC PWC MNC CATI CATIIIA CATIIIB ENTRYAGE OLDER ADMIN AVIATION OPS ENG AFLOAT APPADC FACTOR41 FACTOR42 Q114A Q114BC Q114D Q114E Q114F).

E. SAMPLE RESTRICTIONS

The original survey response data base totalled approximately 2,500 responses. However, the following restrictions were imposed upon the sample to make it more homogeneous.

- This thesis used only active duty regular first-term enlisted personnel, in paygrades E-4, E-5 and E-6, with four years of service.
- Only members who had taken the AFQT were examined in this thesis.
- There were 133 duplicate entries in the survey response data base. These 133 duplicates were deleted.
- All seven Sonar Technician responses were deleted. The ST rating was eliminated early in the fall of 1992 and the subsequent career intentions of these personnel were not known.
- There were only two responses from Musicians. Since musicians have significantly different enlistment situations than all other ratings, they were deleted from the sample.

- Data analysis of the survey responses highlighted several trends that required some data manipulation. Significant numbers of single personnel or first termers planning on leaving the service did not respond to family-oriented questions or to questions suggesting reenlistment. Those questions were deleted from the factor analysis.

- For those survey questions or factors actually used in the model, observations were deleted if they contained incorrect or missing survey responses.

- Those personnel indicating they were undecided what they would do at the end of their first enlistment were deleted from the sample, to increase the differences between stayers and leavers.

- Research suggests the factors which influence the stay-or-leave decisions are different for males and females. Also, the percentage of females who were stayers was very different than the percentage of males who were stayers. Since there were not enough females for a separate female retention model, the 53 females in this sample were deleted.

As a result, the model had a sample size of 377 observations. A more detailed description of the sample is provided in Table VI.

TABLE VI

SAMPLE DESCRIPTION

CHARACTERISTICS	FIRST TERM MODEL Number	Percentage
INTENTIONS (Derived from Survey Q16)		
Leave the Service	138	36.6
Stay	239	63.4
Actual STAYERS Behavior		
1 = Left the Service	138	36.6
0 = Stayers	239	63.4
Race		
White	343	91.0
Minority (Total)	34	9.0
Black	10	2.7
Hispanic	17	4.5
American Indian	3	0.8
Asian	4	1.1
Family Status		
Single No Children (SNC)	130	34.5
Personnel With Children (PWC)	140	37.1
Married No Children (MWC)	107	28.4
Education Level		
Non-High School Grad	3	0.8
High School Grad/GED	374	99.2
College Experience	53	14.1
AFQT		
CAT I	24	6.4
CAT II and CAT IIIA	297	78.8
CAT IIIB	56	14.9
ENTRYAGE		
17	38	10.1
18	118	31.3
19	55	14.6
20	49	13.0
21	37	9.8
22	26	6.9
23	22	5.8
24	8	2.1
25	10	2.7
26	10	2.7
27	4	1.1
PAYGRADE		
E-4	197	52.3
E-5	130	34.5
E-6	36	9.5

TABLE VI (Continued)

SAMPLE DESCRIPTION

CHARACTERISTICS	FIRST TERM MODEL Number	Percentage
Rating		
Administration	91	24.1
HS	10	2.7
PA	2	0.5
RM	28	7.4
SK	21	5.6
SS	8	2.1
YN	22	5.8
Aviation	65	17.2
AD	17	4.5
AE	10	2.7
AM	13	3.4
ASM	12	3.2
AT	13	3.4
Engineering	146	38.7
DC	17	4.5
EM	13	3.4
ET	31	8.2
MK	70	18.6
TT	15	4.0
Ops (Deck & Ordnance)	75	19.9
BM	47	12.5
MST	5	1.3
QM	8	2.1
RD	3	0.8
FT	5	1.3
GM	7	1.9
Present Unit AFLOAT		
Yes	81	21.5
No	296	78.5
ADC Endorsements		
Approved	195	51.7
Conditionally Approved/Disapproved	182	48.3
WHAT ONE ITEM MAKES PERSONNEL THINK MOST ABOUT LEAVING THE COAST GUARD		
Q114A (PAY & BENEFITS)	75	19.9
Q114BC (COMMAND CLIMATE/COWORKERS)	133	35.3
Q114D (SELF DEVELOPMENT)	31	8.2
Q114E (WORK ENVIRONMENT)	15	4.0
Q114F (PERSONAL & FAMILY LIFE)	122	32.4
Total Number of Personnel	377 Personnel	

F. DATA LIMITATIONS AND PROBLEMS

This sample is comprised of cross sectional data. It is limited in that it is representative of CG enlisted personnel only at the time of the survey, between October 1991 and November 1992. A similar survey conducted just a few years later could very well yield different results, since the sample would be comprised of different people with different expectations and needs, as well as the effects of possible revisions to organizational policies and changes in economic conditions.

1. PMIS Data Base

An important PMIS data base element could not be used due to errors. Several unknown OPFACs were entered into the PMIS data base elements that indicate past and present units, PUIOP and PRANK, and unit types, UNTYP, for over half the sample. Since the correct units could not all be determined, these elements were not used. This was unfortunate, since type of unit to which assigned is believed to have a significant influence upon retention behavior.

2. Survey

Survey analysis was slightly hampered by several problems. First, about one third of the first-term enlisted personnel (and, incidentally, nearly one half of the personnel in their second and third enlistments) did not answer one or

more survey questions. This limited the number of useable observations for the retention model.

Also, many respondents answered questions incorrectly. While stray marks may have caused some errors, poor survey answer sheet design appeared to contribute to most of the errors. Most incorrect responses involved selecting answers that were not listed as possible responses for a particular question. However, several personnel also provided logically inconsistent responses to Q72, the highest rank members expected to attain in the Coast Guard. Several personnel indicated they had career aspirations for captain or flag rank, yet they did not intend on making the service a career in the first place.

Nonetheless, deleting the missing and incorrect observations may bias the model's results. If the bulk of bad responses can be attributed to specific groups of personnel, deleting them from the sample may significantly alter the makeup of the sample, as well as survey responses and model results.

Some questions were designed in a manner that made it easy to use them in a regression analysis, while others provided responses that made it too difficult to use them. Q114, Q116 and Q118 were recoded into dummy variables, to permit easier interpretation of the wide variety of results. Likewise, Q115, Q117 and Q119 should have been recoded into dummy variables to permit their use in the models. However,

since the number of useable responses was so small for the last three questions, they were not used. Interestingly, about equal numbers of personnel skipped Q116 and Q118. This might suggest that all the six categories failed, or succeeded, about equally in satisfying those members who skipped the questions.

Cross tabulations of the survey responses and PMIS data base variables indicated that single personnel tended not to answer family-oriented questions, such as Q31, Q50, Q53, Q60, Q88, Q91, Q101 and Q104. Also, some questions implied members would have to reenlist to answer them, such as Q57-Q59, Q74, Q80, Q90 and Q116-Q119. Instead, it was not unusual to find 50 to 180 members (about half the sample size) responding "Not Applicable" or simply skipping such questions. Observations with more than 25 "Not Applicable" or missing responses were deleted from the sample.

3. Selection Bias

The survey was a voluntary device. There was no follow-up conducted to increase the participation rates. Consequently, it was anticipated that some groups of enlisted personnel would be more likely to respond than others. Particularly, the response rate was expected to increase as years of service and paygrade increased. More senior enlistees were expected to have stronger ties and feelings of responsibility to the organization, exhibited through a

stronger desire to respond to the service's voluntary request. On the other hand, those personnel who felt particularly strongly about the issues and problems facing enlisted personnel, and believed the survey was a useful feedback tool were also thought more likely to respond. Survey results may reflect the impact of variation in response rate.

Similarly, different levels of thought and effort are put into survey responses. Although going through the motions of filling out the survey, some personnel may have purposely provided insincere or inadequately-thought-out responses. While it is easy to suggest that the younger, less mature personnel may be inclined to respond this way, it might just as likely be done by frustrated or embittered personnel who have been in the organization a longer time.

IV. DATA ANALYSIS

A. MODEL RESULTS

Model results are provided in Table VII and Table VIII and described in greater detail below.

Table VII provides the -2 LOG L criterion for model assessment. The -2 LOG L ratio for the restricted case, where H_o assumes all the B_k values equal zero, is greater than for the second case, in which all the explanatory variables are added to the model. The model Chi-square score, which is the difference between the intercept only and the intercept with covariates, is 26.4. It has an associated probability of 0.0904. Therefore, H_o can be rejected at the .1 level and it can be concluded that the model has statistically significant explanatory power.

The model correctly predicted retention for 51.2 percent of the sample. As shown in Table VIII, six of the 18 explanatory variables in the model were statistically significant at the .1 level: AFQT categories IIIB-IV, entryage, FACTOR41 (Job Satisfiers), and Q114A, Q114D and Q114E (personnel who thought most about leaving the Coast Guard due to pay and benefits, self-development and personal/family life issues). Retention rates among the three paygrades were 67 percent for E-4, 61.5 percent for E-5 and 50 percent for E-6.

TABLE VII

CRITERIA FOR ASSESSING FIRST-TERM MODEL FIT

CRITERION	INTERCEPT ONLY	INTERCEPT & COVARIATES	CHI-SQUARE FOR COVARIATES
-2 LOG L	495.2	468.8	26.4 with 18 DF (p=0.0904)

TABLE VIII

MODEL RESULTS

VARIABLE	B ESTIMATE	STANDARD ERROR	CHI-SQUARE PROBABILITY VALUE	MEAN	STANDARD DEVIATION	PARTIAL EFFECTS OF EACH INDIVIDUAL B
INTERCEPT	0.437	0.345	0.206			
SNC	-0.104	0.275	0.706	0.345	0.476	-0.025
MNC	0.398	0.294	0.175	0.284	0.451	0.090
CATI	-0.636	0.452	0.154	0.064	0.244	-0.159
CATIIIB	-0.526	0.316	0.096	0.149	0.356	-0.129
E5	-0.209	0.257	0.415	0.345	0.476	-0.051
E6	-0.494	0.405	0.222	0.095	0.294	-0.122
OLDER	0.591	0.293	0.044	0.212	0.409	0.129
OPS	-0.460	0.315	0.144	0.172	0.378	-0.113
ADMIN	0.175	0.296	0.555	0.241	0.428	0.041
AVIATION	-0.375	0.332	0.259	0.172	0.378	-0.092
AFLOAT	0.197	0.291	0.499	0.215	0.411	0.046
APPADC	-0.305	0.232	0.190	0.483	0.500	-0.075
FACTOR41	0.034	0.116	0.086	0.0	1.000	0.008
FACTOR42	-0.075	0.117	0.522	0.0	1.000	-0.018
Q114A	0.545	0.317	0.086	0.199	0.400	0.120
Q114D	0.997	0.480	0.038	0.083	0.275	0.200
Q114E	0.929	0.650	0.153	0.040	0.196	0.189
Q114F	0.523	0.277	0.059	0.324	0.468	0.116

B. EXPLANATION OF RESULTS AND PARTIAL EFFECTS

The logit model provides the log of the odds of staying in the Coast Guard for a person with a specific set of characteristics as described by the independent variables. Since any kind of person can be described by the equation, a reference point is needed against which one can evaluate the log of the odds of retention for people with different characteristics. That reference point, or base case individual, is often taken to be the most common type of individual found in the sample. Partial effects can be used to measure the impact of each independent variable upon the base case individual's probability of retention. Since the logit model is nonlinear, the magnitude of the partial effects are conditional upon the specific base case.

The base case individual is a married or single male E-4 having dependent children, in AFQT category II-IIIA, in the engineering rating group, with an entry age between 17 and 21 years and mean factor scores. Command climate and coworker issues were the issues that made this referent individual think about leaving the service the most. The base case probability of staying was 0.608. Hence, the changes in retention probability discussed below were calculated by altering one independent variable while holding all others constant.

SNC was not statistically significant and was negatively signed, associated with a decreased retention probability forsingle personnel who had no children in relation to the base case PWC. Most other turnover studies have also found single personnel with no children to have a lower retention probability.

MNC was not statistically significant at the .1 level and was positively signed, associated with an increased retention probability for married E-4 personnel who had no children in relation to the base case PWC.

CATI was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability for AFQT category I personnel in relation to base case AFQT category II and IIIA personnel. Most other turnover studies have also found that AFQT category I enlisted personnel leave the service at a rate equivalent to or higher than personnel in lower AFQT categories.

CATIIIB was statistically significant at the .1 level and negatively signed, associated with a decreased retention probability for AFQT category IIIB and IV personnel in relation to base case AFQT category II and IIIA personnel. The partial effect for CATIIIB, -0.129, indicated that AFQT category IIIB and IV personnel were 12.9 percent less likely to stay in the Coast Guard than AFQT category II and IIIA personnel.

E5 was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability for E-5 personnel in relation to base case E-4 personnel.

E6 was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability for E-6 personnel in relation to base case E-4 personnel. A cross tabulation comparison of E4, E5 and E6 by stayers and leavers revealed retention rates of 67 percent (132 stayers) for E-4, 61.5 percent (80 stayers) for E-5 and 50 percent (18 stayers) for E-6. Although these results were unexpected, they may be a reflection of performance, in that higher performing first-term enlisted personnel (those who receive more advancements in their first four-year enlistment) were more likely to leave the service to pursue other employment opportunities.

OLDER was statistically significant at the .05 level and positively signed, associated with an increased retention probability for enlisted whose ages upon original entry into the service were between 22 and 27 years, in relation to base case personnel whose ages upon entry into the service were between 17 and 21 years. The partial effect for OLDER, 0.129, indicated that personnel in the OLDER category were 12.9 percent more likely to stay in the Coast Guard than personnel in the YOUNGER category.

OPS was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability in relation to base case engineering personnel. **ADMIN** was not statistically significant at the .1 level and was positively signed, associated with an increased retention probability in relation to base case ENG personnel. **AVIATION** was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability in relation to base case ENG personnel.

AFLOAT, a proxy variable for type of unit, was not statistically significant at the .1 level and was positively signed, associated with an increased retention probability for first-term male enlisted personnel assigned to floating units.

APPADC, a proxy variable for enlisted performance evaluations, was not statistically significant at the .1 level and was negatively signed, associated with a decreased retention probability for personnel who have received positive command endorsements on their Assignment Data Cards. The negative sign may have accounted for some of the effects of conduct and quality of performance, which were not otherwise accounted for in the model. It is possible that those individuals receiving positive command endorsements were generally better performers who tended to leave the service to pursue more satisfying alternative careers.

FACTOR41, Job Satisfiers, was statistically significant at the .1 level and positively signed, associated with an

increased retention probability for personnel responding that alternative civilian non-pecuniary job satisfiers were better than Coast Guard job satisfiers. The partial effect for FACTOR41, 0.008, indicated an increase of one standard deviation (1.00) to the mean value of FACTOR41, (0), would increase the probability of staying in the Coast Guard by only 0.8 percent. This variable suggests personnel who responded that civilian alternatives provided more non-pecuniary job satisfaction than military ones were more likely to be stayers. Although the sign of this variable was unexpected, a detailed cross tabulation data examination indicated that E-4 personnel were much more likely to perceive alternative civilian jobs as more satisfying, while E-5 and E-6 personnel were more likely to perceive either no difference or more satisfaction from Coast Guard jobs. The fact that E-4 personnel made such observations and still stayed in the service at the end of their first enlistment might suggest they expected non-pecuniary job satisfaction within the Coast Guard to improve with subsequent advancements and assignments. Such action suggests junior personnel may be more future-oriented than expected, since the benefits they desire are more likely to accrue only to those who stay with the organization for a longer period of time.

FACTOR42, Job Security and Benefits, was not statistically significant and was negatively signed, associated with a decreased retention probability for personnel responding that

alternative civilian job training, advancement and security and benefits were better than those offered by the Coast Guard.

Q114A was statistically significant at the .1 level and positively signed, associated with an increased retention probability for personnel selecting this response in comparison to the base case Q114BC personnel. The partial effect for Q114A, 0.120, suggested people who thought about leaving the service most because of dissatisfaction with pay and benefits were 12 percent more likely to stay in the service than people who thought about leaving the service most because of dissatisfaction with command climate and coworker issues. This may be reasonable for first termers, who are likely to enter the service with limited work experience. Their exposure to many new employee-employer and coworker issues might therefore have had strong effects upon their retention decisions. Also, Ehrenberg and Smith [Ref. 9] suggest that a compensating wage differential exists for enlisted recruits of about 18 percent above that for civilian youths. They contend that the military pay must remain at a level sufficient to compensate for the hazards and inconveniences of military life. It is possible this compensating wage may have induced many of the first-term personnel to stay in the service when they examined their employment options at the end of their first enlistment.

Q114D was statistically significant at the .05 level and positively signed, associated with an increased retention

probability for personnel selecting this response in comparison to the base case Q114BC personnel. The partial effect for Q114D, 0.200, suggested that people who thought about leaving the service most because of dissatisfaction with self development issues are 20 percent more likely to stay in the service than people who thought about leaving the service most because of dissatisfaction with command climate and coworker issues.

Q114E was not statistically significant at the .1 level and was positively signed, associated with an increased retention probability for personnel selecting this response in comparison to the base case Q114BC personnel. This suggests that personnel responding to Q114E are not significantly different from the base case Q114BC personnel.

Q114F was statistically significant at the 0.05 level and positively signed, associated with an increased retention probability for personnel selecting this response in comparison to the base case Q114BC personnel. The partial effect for Q114F, 0.116, suggested people who thought about leaving the service most because of dissatisfaction with family and personal life issues in the Coast Guard were 11.6 percent more likely to stay in the service than people who thought about leaving the service most because of dissatisfaction with command climate and coworker issues.

Variance Inflation Factors were computed as a measure of multicollinearity and yielded values less than 1.8 for all variables, indicating no serious multicollinearity problems among the variables in the model. All correlations were less than 0.2, except for APPADC with E4 (-0.22427), APPADC with E5 (0.21489), PWC with E6 (0.21727) and AVIATION with AFLOAT (-0.23877).

C. COMPARISON OF RETENTION MODEL TO ACTUAL RETENTION BEHAVIOR

Table IX provides an interesting comparison of the predictions of the first-term enlisted retention model to actual retention behavior. It illustrates that the model predicted 182 personnel would leave the Coast Guard, of whom only 68 left the service and the remaining 114 personnel stayed. This indicated a Type II Error or False Negative rate of (114/182 = .626) 62.6 percent. Likewise, the model predicted 195 personnel would stay, of whom 125 actually did stay, while the remaining 70 personnel left the service. This indicated a Type I Error or False Positive rate of (70/195 = .359) 35.9 percent. The overall accuracy of the model was ((68 + 125)/377 = .512) 51.2 percent.

Sensitivity, the proportion of true positives predicted by the model to be positive, or in this case, actual stayers predicted to be stayers, was 52.3 percent. Specificity, the proportion of true negatives predicted by the model to be

negative, or actual leavers predicted to be leavers, was 49.3 percent.

TABLE IX

CONTINGENCY TABLE

	PREDICTED BY MODEL		
ACTUAL	LEAVE	STAY	**TOTAL**
LEAVERS	68	70	138
STAYERS	114	125	239
TOTAL	182	195	377

Goodness-of-fit can be measured using the percentage of cases the model predicted correctly. The naive cutoff point of the sample, which reflects the action of that portion of the sample in which we are interested, was that portion of the sample that decided to remain in the Coast Guard (the mean stay rate), and equalled (239/377 = .634) 0.634. When using the model, a resultant probability value greater than 0.634 classified the individual as a stayer, and a probability value less than 0.634 classified the individual as a leaver.

The naive rule predicted that everyone would stay, which was correct (239/377 = .634) 63.4 percent of the time. As shown earlier, the overall accuracy of the model was 51.2 percent, which was less than the 63.4 percent for the naive rule. Ideally, the model should have yielded a result greater

than 63.4 percent, to be more accurate than merely assuming that an individual would act the same as the majority of personnel.

D. COMPARISON OF INTENT TO ACTUAL RETENTION BEHAVIOR

A cross tabulation comparison of INTENT (based upon responses to Q61) to actual retention behavior is provided in Table X. It illustrates that 138 personnel intended to leave the Coast Guard, of whom only 58 did leave while the remaining 83 personnel changed their minds and stayed. This indicated a Type II Error or False Negative rate of (83/138 = .601) 60.1 percent. Likewise, 239 personnel intended to stay, of whom 156 actually did stay while the remaining 83 personnel chose to leave the service. This indicated a Type I Error or False Positive rate of (83/239 = .347) 34.7 percent. The overall accuracy of intentions, based upon responses to Q61, was ((58 + 156)/377 = .568) 56.8 percent.

TABLE X

COMPARISON OF INTENT TO ACTUAL BEHAVIOR

	INTENTIONS		
ACTUAL	LEAVE	STAY	**TOTAL**
LEAVERS	55	83	138
STAYERS	83	156	239
TOTAL	138	239	377

A comparison of stayers and leavers by INTENT indicated that a slightly larger percentage of stayers were personnel who intended to stay, just as a slightly larger percentage of leavers were personnel who intended to leave. Surprisingly, the correlation between INTENT and actual STAYERS was positive but very weak (.05127).

On the basis of accurate classification, the variable INTENT is not a good predictor of retention. The naive cutoff point of the sample, which reflects the action of that portion of the sample in which we are interested, was the portion that decided to remain in the Coast Guard (the mean stay rate), and equalled (239/377 = .634) 0.634. When using the model, a resultant probability value greater than 0.634 classified the individual as a stayer, and a probability value less than 0.634 classified the individual as a leaver.

As shown earlier, the overall accuracy of INTENT is 56.8 percent, which is less than the 63.4 percent for the naive rule. Ideally, INTENT should have yielded a result greater than 63.4 percent, to be more accurate than merely assuming that an individual would act the same as the majority of personnel. This suggests that INTENT was a poor predictor of retention behavior for this sample. INTENT should not be used as a proxy for actual stay/leave behavior because this would provide very misleading results.

V. CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

This thesis investigated the factors that influenced the retention decisions of 377 Coast Guard male, first-term, four-year enlisted personnel. A multivariate logit regression model was estimated using demographic, trainability, enlisted, enlisted performance and unit characteristics found in the Coast Guard Personnel Management Information System, as well as results from the Coast Guard's 1991-1992 CAREER DECISION SURVEY, to determine their relative importance in retention behavior.

Only six of the 18 variables had a significant impact upon retention. Among trainability characteristics, AFQT category IIIB and IV personnel had significantly lower probabilities of staying in the service. Among the enlisted characteristics, personnel who were 22-27 years old upon initial entry into the service were significantly more likely to stay. The career decision survey results suggested personnel (particularly E-4) who believed civilian alternatives provided more job satisfaction than military ones were nonetheless significantly more likely to be stayers. Also, personnel who thought about leaving the Coast Guard the most due to dissatisfaction with

pay and benefits, self-development, or family and personal life issues were significantly more likely to stay in the service than personnel who thought about leaving the Coast Guard the most due to dissatisfaction with command climate or coworker issues. Finally, the variable INTENT was determined to be a poor predictor of actual retention behavior.

There may be several reasons for 12 of the variables not having any significant impact upon retention. First, only weak proxy variables were available to account for the effects of enlisted performance evaluations and type of unit. Also, as discussed in Chapter IV, the survey was a voluntary instrument and was not administered in a controlled manner. Third, the survey was lengthy and respondents may have regarded some questions as redundant. Some of the questions may have provided more useful results if designed differently. For example, Q114 through Q119 each allowed only a single response to a set of four to seven questions; hence useful information regarding met and failed expectations associated with those issues that were not selected is not available.

To indicate the role of the survey questions used in the model, the model was respecified without any survey variables. Using only the PMIS-derived variables from the model, results provided in Tables XI and XII were only slightly worse than those of the full model (provided on page 59). This suggests

TABLE XI

CRITERIA FOR ASSESSING FIT OF MODEL USING ONLY PMIS-DERIVED VARIABLES

CRITERION	INTERCEPT ONLY	INTERCEPT & COVARIATES	CHI-SQUARE FOR COVARIATES
-2 LOG L	495.2	477.4	17.8 with 12 DF (p=0.1215)

TABLE XII

RESULTS OF MODEL USING ONLY PMIS-DERIVED VARIABLES

VARIABLE	B ESTIMATE	STANDARD ERROR	CHI-SQUARE PROBABILITY VALUE
INTERCEPT	1.358	0.369	0.000
SNC	-0.172	0.267	0.519
MNC	0.335	0.285	0.239
CATI	-0.575	0.445	0.197
CATIIIB	-0.426	0.306	0.165
E5	-0.200	0.249	0.422
E6	-0.566	0.391	0.147
OLDER	0.529	0.288	0.066
OPS	-0.343	0.300	0.253
ADMIN	0.142	0.293	0.627
AVIATION	-0.268	0.323	0.407
AFLOAT	0.204	0.283	0.469
APPADC	-0.292	0.228	0.200

that the 1991-1992 CARRER DECISION SURVEY measures of respondents' assessments of alternative civilian jobs and satisfaction with issues involving pay and benefits, command climate, coworkers, self-development, working environment, and personal and family life were of little help in explaining actual Coast Guard retention.

B. IMPLICATIONS

The econometric retention model results of this study should be used for manpower-related policy analysis only with due regard for the small sample size, potential bias and the lack of accurate enlisted performance and type-of-unit explanatory variables.

Current military personnel research suggests that keeping capable and energetic personnel in the service is going to become even more difficult in the future, with the increasing quality-of-work and quality-of-personal-life expectations and as civilian employment alternatives become more appealing. The results of this thesis suggest that actions to improve the general Coast Guard working conditions and job satisfaction, as well as pay and benefits, self-development issues and service impact upon personal and family life, appear likely to have positive impacts upon retention. Such actions might include providing training and educational opportunities, improving family-oriented services, protecting military pay and maintaining reasonable advancement opportunities for all

rating groups. Any effort to improve job satisfaction in the Coast Guard vis-a-vis civilian alternatives could help maintain the relatively high retention rates of first-term enlisted personnel. Current emphasis upon service-wide adoption of Total Quality Management principles represents an effort in this direction.

Survey results suggest command climate, supervisors and coworkers are most likely to cause people to leave the service. Service-wide efforts to improve the leadership and management skills of commissioned and petty officers can improve all three of those issues, and may yield improved job satisfaction and increased retention among enlisted personnel.

First-term enlisted personnel with dependents may be more likely to stay in the service than single first-termers. It is recommended that the Coast Guard continue its emphasis on family-oriented programs.

C. RECOMMENDATIONS FOR ADDITIONAL RESEARCH

Additional research into the analysis of Coast Guard enlisted personnel retention is recommended. Particular effort should be directed towards trying to determine why the survey variable INTENT was such a poor predictor for actual stay/leave behavior in this sample. Since the survey was administered only about three months before the individuals had to make their stay-or-leave decision, the weak relationship between INTENT and actual retention behavior is surpris-

ing. Evidently, something else occurred which was not captured by the variables in this model.

Perhaps personnel who had not made their final stay-or-leave decisions as of survey administration time tried to guess their intentions when answering Q16. Also, to the individuals evaluating their stay or leave options, the consequences of their decision probably appear awesome. They may perceive various job and educational opportunities being lost, forever, with dire consequences upon their quality of life as a result of their stay-or-leave decision. The additional task of filling out a retention survey under such a high level of personal anxiety could help organize their thoughts or cause them to disregard the survey.

The survey was plagued with three other distinct problems, as well. First, many respondents without dependents skipped questions that dealt with dependent/family issues, such as Q31, Q50, Q53, Q60, Q88, Q91, Q101 and Q104. Other respondents having no intention of staying in the service skipped questions that dealt with reenlistment issues, such as Q57, Q58, Q59, Q74, Q116, Q118 and Q119. Second, there were no questions directed towards economic and financial issues. Finally, some of the questions might provide more useful results if they or the response categories were reworded.

The Coast Guard must identify the factors affecting the stay/leave decision of its enlisted personnel. Otherwise, the service may overlook policies with cost effective potential

for improved retention. The objectives of the Career Decision Survey are to make descriptive and explanatory assertions about Coast Guard personnel that can be used to develop improved personnel policies. In order to understand better the concerns of its enlisted force, it is recommended that the Coast Guard revise its Career Decision Survey, provide consistent survey administration guidelines and combine the survey results with appropriate PMIS elements for a revised retention model. These three steps are discussed in more detail below. A copy of the survey is attached in APPENDIX A.

1. Survey Revisions

Survey revision may be prudent to reduce the number of questions and unusable responses. Such revisions include:

- change the responses for Q114-Q119 to a rating scale, as in Q74-Q113,
- add "subordinates" to response category "C" for Q114, Q116 and Q118,
- place all dependent/family-oriented questions in a separate section to be answered only by personnel having dependents,
- delete the "Not Applicable" response category from Q17-Q60 and Q74-Q113, since it was used inappropriately by many personnel,
- provide a "No Opinion" response and an equal number of agree and disagree responses to Q17-Q32,
- add a "Don't Know" response to Q61-Q69,
- reword Q68 to define better what is meant by the "best" job,

- determine spouse's income level or total family income level and total amount of debt,
- determine county and state that members would return to if leaving the Coast Guard, so an unemployment rate variable could be specified,
- determine type of civilian job and/or type of training or education members would have accepted, if leaving the Coast Guard. Census data from the 1990 Census and data being developed by the Defense Manpower Data Center may be able to yield a more accurate estimate of civilian pay alternatives and the effect of wage differentials upon reenlistment,
- combine the last three response categories in Q72,
- obtain the input of a social scientist with experience in developing survey instruments, to ensure the survey addresses the desired items as concisely as possible.

2. Survey Administration Procedure Revisions

Tighter, more consistent survey administration procedures may improve both the quantity of survey returns and quality of survey responses. According to Babbie [Ref. 2], such procedures may include:

- a strongly-worded, customer-oriented survey cover letter that pointedly explains the purpose of the survey and how it will impact the lives of Coast Guard personnel,
- standardize the time of day (preferably early morning) and length of time for survey administration for all units,
- designate an individual at each unit to oversee the survey administration process. This can significantly improve the quality of responses and return rate,
- follow-up procedures may be justified; by increasing the number of survey returns, biases may be reduced. However, this be difficult to accomplish, since many personnel will have already left the service. Also, there is an in-

creased likelihood of bias, since personnel who are directed to submit overdue surveys may be more likely to answer them without much concern for accuracy. Follow-up mailings, including a new copy of the survey and instructions, should be sent about one month after the original mailing.

3. Retention Model Revision

There are several additional variables that should be examined and included in the retention model. These variables have either been hypothesized to provide additional explanatory power to the model, or have been shown to increase significantly the explanatory power of other researchers' retention models. They may be obtained from existing Coast Guard data bases, and include:

- type of duty station to which previously and presently attached, using Operating Facility Codes (OPFACs) as a basis for categorization of duty stations,
- number and speed of advancements, compared to the average rate of advancement for each rating,
- enlisted performance evaluations, to serve as a relatively accurate indicator of job performance,
- a sampling design which draws a larger percentage of minorities than whites.

Cross tabulations of the final sample suggest a minority variable should have been included in the model. Race was not used as a variable because of the limited number of minority personnel. Nonetheless, as Table XIII illustrates, retention

behavior differs by race/ethnic group. The table provides the percentages of stayers and leavers for each race/ethnic group, as well as the total numbers and percentages. Over-sampling of minorities should have been conducted to increase the number of observations for this sample.

TABLE XIII

COMPARISON OF RETENTION BEHAVIOR BY RACE

	BLACK	HISPANIC	AMERICAN INDIAN	ASIAN	WHITE	TOTAL
STAYERS	50.0	76.5	0.0	50.0	63.9	239 63.4
LEAVERS	50.0	32.5	100.0	50.0	36.2	138 36.6
TOTAL	10 2.65	17 4.51	3 0.80	4 1.06	343 90.98	377 100.0

4. Additional Retention Models

The small survey sample size prevented the testing of other retention models. A larger sample size would permit development of additional models for female personnel, married and single personnel and for personnel in subsequent enlistments.

To support the argument for a large sample of female enlistees, cross tabulations of the final sample including the 53 female personnel who were excluded from the model indicated very different retention behavior for females than for males, as illustrated in Table XIV. The table provides the percentages of stayers and leavers for males and females, as well as the total numbers and percentages. Research suggests that the factors affecting female retention are different from those affecting male retention.

TABLE XIV

COMPARISON OF MALE & FEMALE RETENTION BEHAVIOR

	MALE	FEMALE	TOTAL
STAYERS	63.4	56.6	269 62.6
LEAVERS	36.6	43.4	161 37.4
TOTAL	377 87.7	53 12.3	430 100.0

5. Personnel Management Information System Enhancement

Since personnel are the most important and one of the most expensive resources in the Coast Guard, the service's personnel management philosophy must reflect those concepts by

capably managing that valuable resource. The shortcoming of the present Coast Guard PMIS is that it functions as a relational personnel management information system for current data. Increasing budgetary constraints, a greater understanding of personnel management functions and changing sociodemographics call for an enhanced PMIS.

Although there are considerable short-term costs associated with such management information system upgrades, personnel costs are, and will continue to be, a major component of the Coast Guard's budget. An enhanced system will permit improved personnel management and analysis, with long-term cost savings and more appropriate management policies well into the next century.

Two separate steps are suggested to improve the Coast Guard's Personnel Management Information System. First, the following additions are recommended:

- identify and develop all necessary elements commonly required for military personnel analyses,
- incorporate personnel performance data (enlisted evaluations),
- correct inaccurate data elements, such as OPFAC codes in the present and past unit elements,
- continue to refine the relationships among data elements, so that changes to one element will be reflected automatically and correctly in related elements
- maintain a cadre of personnel trained in the analysis of manpower and personnel issues to use the new system and conduct the research for senior personnel managers.

Secondly, a more powerful system, essentially a Personnel Decision Support System, is suggested, which is capable of performing rapidly the following functions:

- capture, store and retrieve large quantities of personnel data (including many of the sociodemographic, job, training, and unit characteristics found in PMIS, as well as personnel performance-related data and economic indicators),
- use neural networks and sophisticated mathematical models to analyze the data for relationships and forecast accessions, retention and flow rates,
- display data and model results visually with graphics,
- integrate data, models and their results to enhance force planning, maintenance and restructuring.

In essence, this Personnel Decision Support System would integrate personnel data, mathematical models and graphical display packages to enable senior Coast Guard personnel managers to ask "what if" questions and forecast the impact of new personnel policies upon the force structure. An improved survey instrument, combined with appropriate PMIS data base elements in a Personnel Decision Support System, can provide senior Coast Guard personnel managers with powerful managerial tools that will permit more appropriate management policies and long-term personnel-related cost savings well into the next century.

APPENDIX A

U.S. COAST GUARD CAREER DECISION SURVEY QUESTIONS

People cite several reasons for enlisting in the Coast Guard. Using the scale at the right, rate how important each of the below listed reasons (items 1-15) were for your enlisting in the Coast Guard.

Legend	
[1]	Not at all important
[2]	Somewhat important
[3]	Very important
[4]	I would not have joined except for this.

1. Educational Opportunities.
2. Pay and Benefits
3. Job Security
4. Prestigious Job
5. Equal Opportunity to Advance
6. Opportunity to serve my country
7. Challenging Work
8. Humanitarian Missions of the Coast Guard
9. Desire to do something exciting
10. Desire to move away from home
11. Opportunity to retire after only 20 years of service
12. Pressure from Parents
13. Get training in a skill to get a civilian job when I get out
14. Jobs at home were unavailable
15. For a Coast Guard career

16. What do you currently plan to do when your enlistment ends?
[1] Get out of the Coast Guard
[2] Extend
[3] Re-enlist
[4] Retire
[5] Undecided

Using the scale at the right, rate each of the below listed statements (items 17-32) with respect to your **current** job in the Coast Guard.

Legend	
[1]	**Strongly Disagree**
[2]	**Disagree**
[3]	**Somewhat agree**
[4]	**Agree**
[5]	**Strongly Agree**
[10]	**Not Applicable**

17. My unit provides me all the necessary information to do my job effectively.

18. My unit is very effective in planning the work to be accomplished

19. Information is widely shared at my unit so that those needing it have it available.

20. My unit is very interested in the attitudes of group members toward their jobs.

21. My unit has a very strong interest in the welfare of its people.

22. I feel responsible to my unit in accomplishing its missions.

23. I feel motivated to contribute my **best** efforts to the mission of the Coast Guard.

24. My unit rewards individuals based on performance.

25. My supervisor sets high performance standards.

26. My supervisor establishes good work procedures.

27. My supervisor makes his/her responsibilities clear to the group.

28. My supervisor performs well under pressure.

29. My supervisor lets me know when I am doing a good job.

30. My supervisor frequently gives me feedback on my performance.

31. My family would be better off if I took a civilian job.

32. I am being prepared to accept increased responsibility.

Using the scale at the right, rate each of the below listed statements (items 33-50) with respect to your **current** job in the Coast Guard.

Legend	
[1]	Not at all
[2]	To a minor extent
[3]	To some extent
[4]	To a large extent
[5]	To a great extent
[10]	Not Applicable

33. I am aware of promotion/advancement opportunities that affect me.

34. At my unit, people who perform well receive recognition.

35. My work group is usually aware of important events and situations.

36. A high spirit of teamwork exists between co-workers at my unit.

37. My supervisor encourages teamwork

38. The **quantity** of output of my work group is very high.

39. My work group works well under pressure.

40. My work group's performance in comparison to similar work groups is very high.

41. My job provides a great deal of freedom and independence in scheduling my work and selecting my own procedures to accomplish it.

42. I am allowed to make the major decisions required to do my job well.

43. My supervisor allows me to make decisions concerning my job.

44. My work gives me a feeling of pride and self-worth.

45. My job is significant, in that it affects others in an important way.

46. My job requires me to do many different things, using a variety of talents and skills.

47. My job keeps me busy.

48. My job provides me a chance to be responsible for my own work and to know for myself when I do a good job.

49. I am faced with the same type of problems on a routine basis.

50. My spouse and I agree on my career plans

Using the scale at the right, rate each of the below listed statements (items 51-54) with respect to your **current** job in the Coast Guard.

Legend	
[1]	Not at all
[2]	To a minor extent
[3]	To some extent
[4]	To a large extent
[5]	To a great extent
[10]	Not Applicable

51. My job offers me a chance to help people.

52. My job offers me an opportunity to meet new people.

53. My family has pride in my work.

54. My job offers me the chance to do things not violating my sense of "right and wrong".

Using the scale at the right, answer each of the below listed questions. (items 55-59)

Legend	
[1]	No chance
[2]	A small chance
[3]	Some chance
[4]	A large chance
[5]	Certain
[10]	Not Applicable

55. What do you think your chances are of being promoted to the next higher paygrade?

56. What do you think your chances are of receiving additional training if you stay in the service?

57. What are the chances that your next tour of duty will be in a **location** that you find desirable?

58. What are the chances that your next tour of duty will involve **duties** you find desirable?

59. What are the chances that your next tour of duty will be at a **type of unit** that you find desirable?

60. In the past year, how many months were you completely separated from your spouse, dependents, or significant others because of your military assignments?

[1]	Not at all	[6]	4 months
[2]	Less than 1 month	[7]	5 months
[3]	1 month	[8]	6 to 11 months
[4]	2 months	[9]	12 months
[5]	3 months	[10]	Not Applicable

NOTE: PLEASE TURN ANSWER SHEET TO SIDE TWO.

Think for a moment about the kind of civilian work you could probably do if you left military service. How would this work compare with your present military work in regards to the following items. Please use the scale at the right to answer these questions. (items 61 - 69)

Legend	
[1]	**Military better**
[2]	**No difference**
[3]	**Civilian better**

61. Pay

62. Chances for advancement

63. Chances for further training and learning job skills

64. Steady secure work

65. Interesting Work

66. Retirement plan, medical plan and fringe benefits

67. Highly respected job

68. Freedom to do the job I think was best

69. Chances to be a leader

70. Which of the following best describes your current career plans?

[1] Get out as soon as my enlistment is complete.

[2] Stay in the Coast Guard for a few more years and then get out.

[3] Stay in the Coast Guard until I am eligible for retirement and then get out.

[4] Stay in the Coast Guard more than 20 years and then retire at my convenience.

[5] Stay in the Coast Guard as long as possible.

[6] Undecided.

---

71. How sure are you of your career plans?

[1] Not sure

[2] Somewhat sure

[3] Very sure

[4] Absolutely certain

---

72. What is the highest rank you expect to achieve before leaving the Coast Guard? (Mark one.)

[1] E-1 to E-4

[2] E-5 to E-6

[3] E-7 to E-9

[4] E-10

[5] CWO2 to CWO4

[6] O-1 to O-3

[7] O-4 to O-5

[8] O-6

[9] Flag Officer

[10] Commandant of the Coast Guard

---

73. How many years of service do you expect to have completed when you leave the Coast Guard? (Mark one.)

[1] 0 to 5 years

[2] 6 to 10 years

[3] 11 to 15 years

[4] 16 to 19 years

[5] 20 years

[6] 21 to 25 years

[7] 26 to 30 years

[8] More than 30 years

Based on your Coast Guard experience, rate your satisfaction with the following items (items 74-97) using the scale on the right.

Legend
[1] Very Dissatisfied
[2] Somewhat Dissatisfied
[3] Neither Satisfied nor Dissatisfied
[4] Somewhat Satisfied
[5] Very Satisfied

[10] Not Applicable

74. Retirement benefits
75. Pay and allowances
76. Housing
77. Job training/in service educatio.
78. Job security
79. Equality of treatment
80. Opportunity to serve my country
81. Opportunity to use my skills and training
82. Missions of the Coast Guard
83. My current job
84. Geographic location
85. Co-workers
86. Supervisors
87. Promotion opportunities
88. Family separation
89. Arduous/isolated/sea duty
90. PCS moves
91. Family's feelings about the Coast Guard
92. Medical/dental benefits
93. Personal freedom
94. Working hours
95. Bureaucracy and "red tape"
96. Exchanges and commissaries
97. Recognition of my contributions

Based on your Coast Guard experience, rate your satisfaction with the following items (items 98-113) using the scale on the right.

Legend	
[1]	Very Dissatisfied
[2]	Somewhat Dissatisfied
[3]	Neither Satisfied nor Dissatisfied
[4]	Somewhat Satisfied
[5]	Very Satisfied
[10]	Not Applicable

98. Control over daily work assignments

99. Fairness of evaluations

100. Safety of working conditions

101. Family service programs

102. Acquaintances/friendships

103. Assignment stability

104. Environment for families

105. Working/Environmental conditions

106. Opportunity to control my personal life

107. Chance to do my best

108. Being treated like an individual

109. Grooming standards

110. Rules and regulations

111. Type of jobs you have been able to do

112. Everyday Coast Guard life

113. The Coast Guard overall

Please review Table 1 below. Considering all of the items listed, which item makes you think about **leaving** the Coast Guard the most?

114. Please select a major category [A to F].

115. Please select a specific item in that category [1-7].

When you first joined the Coast Guard, you had several ideas about what service life would be like. Based on your experience in the Coast Guard, which one of the items in Table 1 **most failed to live up to your expectations?**

116. Please select a major category [A to F].

117. Please select a specific item in that category [1-7].

Which one of the items listed in Table 1 has **most satisfied you** while serving in the Coast Guard?

118. Please select a major category [A to F].

119. Please select a specific item in that category [1-7].

A. PAY & BENEFITS	1. RETIREMENT BENEFITS 2. PAY AND ALLOWANCES 3. HOUSING 4. JOB SECURITY 5. MEDICAL/DENTAL SERVICES 6. FAMILY SERVICES PROGRAMS
B. COMMAND CLIMATE	1. BUREAUCRACY & RED TAPE 2. RULES & REGULATIONS 3. RECOGNITION OF MY CONTRIBUTION 4. TREATMENT LIKE AN INDIVIDUAL
C. PEOPLE I WORK WITH	1. FAIRNESS OF EVALUATION 2. EQUALITY OF TREATMENT 3. CO-WORKERS 4. SUPERVISORS 5. ACQUAINTENCES/FRIENDSHIPS
D. SELF DEVELOPMENT	1. OPPORTUNITY TO SERVE COUNTRY 2. OPPORTUNITY TO USE MY SKILLS/TRAINING 3. MISSIONS OF THE COAST GUARD 4. CHANCE TO DO MY BEST 5. TYPE OF JOB I DO 6. JOB TRAINING 7. PROMOTION OPPORTUNITIES
E. WORKING ENVIRONMENT	1. WORKING CONDITIONS 2. WORKING HOURS 3. SAFETY OF WORKING CONDITIONS 4. CONTROL OVER DAILY WORK ASSIGNMENTS
F. FAMILY & PERSONAL LIFE	1. GEOGRAPHIC LOCATION 2. FAMILY SEPARATION 3. PCS MOVES 4. FAMILY'S FEELINGS ABOUT CG 5. ASSIGNMENT STABILITY 6. ENVIRONMENT FOR FAMILIES 7. OPPORTUNITY TO CONTROL PERSONAL LIFE

APPENDIX B

FACTOR ANALYSIS RESULTS - FIRST TERM MODEL

ROTATED FACTANLYS OF PREENLISTMENT - 4 FACTORS

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2	3	4
1	0.71910	0.67643	-0.15712	-0.02564
2	0.68144	-0.65815	0.25337	0.19564
3	-0.12535	0.32594	0.73458	0.58175
4	-0.05317	-0.05514	-0.60951	0.78907

Rotated Factor Pattern

	FACTOR1	FACTOR2	FACTOR3	FACTOR4
Q9	0.72655	.	.	.
Q8	0.68008	.	.	.
Q7	0.66981	.	.	.
Q4	0.64048	.	.	.
Q6	0.58735	.	.	.
Q2	.	0.74460	.	.
Q3	.	0.74421	.	.
Q11	.	0.66251	.	.
Q5	0.41178	0.56043	.	.
Q15	.	0.52941	-0.46555	.
Q14	.	0.42999	.	0.31763
Q13	.	.	0.75984	.
Q1	.	.	0.65204	.
Q10	.	.	.	0.73097
Q12	.	.	.	0.72821

NOTE: Values less than 0.3 have been printed as '.'.

ROTATED FACTANLYS OF PRESENT CGJOB W/O 49 - 2 FACTORS

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2
1	0.80903	0.58777
2	-0.58777	0.80903

Rotated Factor Pattern

	FACTOR1	FACTOR2
Q26	0.83276	.
Q27	0.79707	.
Q28	0.75232	.
Q25	0.74485	.
Q37	0.72471	.
Q29	0.71716	.
Q30	0.67264	.
Q18	0.64459	.
Q20	0.63989	0.32390
Q19	0.60875	.
Q21	0.60007	0.31620
Q17	0.56143	.
Q35	0.54792	.
Q24	0.54642	0.28772
Q34	0.53820	0.32404
Q36	0.53058	0.33919
Q32	0.38991	0.32690
Q48	.	0.68847
Q44	0.28581	0.68178
Q45	.	0.68056
Q46	.	0.63179
Q22	.	0.60280
Q42	0.35329	0.56468
Q47	.	0.54861
Q43	0.42731	0.53370
Q23	.	0.53076
Q51	.	0.52943
Q41	.	0.48009
Q54	.	0.43607
Q52	.	0.39980
Q38	.	0.37577
Q33	.	0.36815
Q39	.	0.35450
Q40	.	0.28576

NOTE: Values less than 0.25 have been printed as '.'.

ROTATED FACTANLYS OF FUTURE CG OPPS VARIABLES - 2 FACTORS

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2
1	0.81744	0.57601
2	-0.57601	0.81744

Rotated Factor Pattern

	FACTOR1	FACTOR2
Q72	0.92478	.
Q73	0.91958	.
Q56	.	0.88866
Q55	.	0.71041

NOTE: Values less than 0.35 have been printed as '.'.

ROTATED FACTANLYS OF EXTERNAL OPPS VARIABLES - 2 FACTORS

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2
1	0.74677	0.66509
2	-0.66509	0.74677

Rotated Factor Pattern

	FACTOR1	FACTOR2
Q68	0.84917	.
Q69	0.71049	.
Q65	0.69837	.
Q67	0.52536	0.43892
Q64	.	0.75551
Q66	.	0.70203
Q62	.	0.56161
Q63	0.42454	0.53059

NOTE: Values less than 0.4 have been printed as '.'.

ROTATED FACTANLYS OF NONJOB - 3 FACTORS

Rotation Method: Varimax

Orthogonal Transformation Matrix

	1	2	3
1	0.68593	0.67241	0.27571
2	0.22463	-0.55636	0.80001
3	-0.69213	0.48681	0.53289

Rotated Factor Pattern

	FACTOR1	FACTOR2	FACTOR3
Q93	0.76207	.	.
Q106	0.74362	.	.
Q94	0.68942	.	.
Q110	0.66727	.	.
Q112	0.62067	0.47220	.
Q113	0.60145	.	.
Q105	0.57402	0.31961	.
Q109	0.50805	.	0.40330
Q82	0.37342	.	0.30124
Q83	0.39736	0.69341	.
Q86	.	0.65698	.
Q98	.	0.65072	.
Q99	.	0.62600	.
Q97	.	0.62808	.
Q85	.	0.58662	.
Q108	0.53440	0.57330	.
Q107	0.46930	0.54983	.
Q79	0.36063	0.53838	.
Q111	0.46631	0.53746	.
Q81	0.39041	0.46492	.
Q77	.	0.43263	.
Q84	.	0.34823	.
Q100	.	0.34214	.
Q96	.	.	0.71469
Q75	.	.	0.58598
Q92	.	.	0.57683
Q76	.	.	0.51597

NOTE: Values less than 0.3 have been printed as '.'.

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